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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,961	12/31/2003	Frank Jansen	M03A209	8578

20411 7590 07/25/2006

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EXAMINER	
JEFFERSON, QUOVAUNDA	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 07/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/749,961	JANSEN, FRANK	
	Examiner	Art Unit	
	Quovaunda Jefferson	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra, US Patent 6,794,284 (which is previously cited) in view of Campbell, US Patent 6,461,436, and further in view of Aitchison, US Patent 5,928,426.

Regarding claim 1, Vaartstra teaches a chemical vapor layer deposition apparatus comprising a precursor gas source **170** having a first valve **184** connected thereto, and a purge gas source **174**, having a third valve **185** connected thereto and a reaction chamber **110**, connected to the said first and said third valves.

Vaartstra fails to teach a first precursor gas source with a first valve connected thereto, a second precursor gas source with a second valve connected thereto, wherein the first, second and third valves permit sequential flow of the first precursor gas, the

second precursor gas and the purge gas defining a deposition cycle; a reaction chamber **110**, connected to the said second valve, a gas phase reaction trap connected to the said reaction chamber, the trap having an inlet connected to said reaction chamber, and an outlet, wherein the, said trap has having a residence time at least equal to one deposition cycle; and a backing pump connected to the said outlet of the said trap and to exhaust.

Campbell teaches a first precursor gas source **6** with a first valve **25** connected thereto, a second precursor gas source **9** with a second valve **8** connected thereto, wherein the first, second and third valves permit sequential flow of the first precursor gas, the second precursor gas and the purge gas defining a deposition cycle (column 3, lines 3-39), and a reaction chamber connected to the said second valve as an apparatus that has separate inlets for each precursor gas used in the deposition apparatus

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Campbell with that of Vaartstra because these independent lines minimizes the reaction of the precursor gases in the pump lines (column 1, lines 58-59)

Vaartstra and Campbell fail to teach a gas phase reaction trap connected to the said reaction chamber, the trap having an inlet connected to said reaction chamber, and

an outlet, wherein the, said trap has having a residence time at least equal to one deposition cycle; and a backing pump connected to the said outlet of the said trap and to exhaust.

Aitchison teaches a gas phase reaction trap **30** connected to the said reaction **14** chamber, the trap having an inlet connected to said reaction chamber (column 12, lines 47-50), and an outlet, wherein the, said trap has having a residence time at least equal to one deposition cycle; and a backing pump connected to the said outlet of the said trap and to exhaust. (column 12, lines 47-50 and column 5, lines 26-50) as part of a trapping apparatus that promotes the complete removal of active gas species from the exhaust gas.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aitchison with that of Vaartsra and Campbell because a trap can further promote the complete removal of active gas species, some of which can be fatal, from the exhaust gas of a reaction chamber.

Regarding claim 3, Vaartstra further teaches including a process pump, connected between the inlet of the trap and the reaction chamber (Note, the pump **114** of Vaartstra could be connected to the inlet of the trap **30** taught by Aitchison).

Regarding claim 5, Aitchison further teaches heating means for the trap (column 5, lines 45-63).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra, Campbell, and Aitchison as applied to claim 1 above, and further in view of Desbiolles, WO 03/101576A1 (as previously cited).

Regarding claim 2, Vaartstra, Campbell and Aitchison fail to teach the inlet and the outlet are at the top of the said trap. Desbiolles teaches an apparatus the inlet **2** and said outlet **6** are at the top of said trap (figure 1) because the optimal effectiveness of the trap can be preserved without harming the usefulness of the chamber (page 3, lines 12-14).

It would have been obvious to one of ordinary skill in this art at the time of the invention to combine the teachings of Desbiolles with that of Vaartstra, Campbell and Aitchison because the optimal effectiveness of the trap can be preserved without harming the usefulness of the chamber.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra, Campbell, and Aitchison as applied to claim 1 above, and further in view of Mariella, US Patent 6,730,204 (as previously cited).

Regarding claim 6, Vaartstra, Campbell and Aitchison fail to teach an electrode in the trap and a ground connection to the said trap. Mariella teaches an apparatus an electrode in said trap and a ground connection to said trap as a trap apparatus that uses DC current (column 5, line 42 and 43. The examiner notes that the trap taught by Mariella contains a DC voltage. An inherent feature of a DC voltage, as well as an AC voltage, contains both an electrode and a ground connection).

It would have been obvious to one skilled in this art to combine the teachings of Mariella with that of Vaartstra, Campbell and Aitchison to in order to fabricate a trap apparatus that is powered on electrical current.

Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra, Campbell, and Aitchison as applied to claim 1 above, and further in view of Robles et al, US Patent 6,663,713 (as previously cited).

Regarding claim 4, Vaartstra, Campbell, and Aitchison fail to teach the residence time is greater than the said deposition cycle. However, Robles teaches the residence

time is greater than the deposition cycle by increasing the residence time through different parameters. To further explain, Robles teaches that the residence time inside of a deposition chamber can be increased through by regulating the flow of precursor gas and carrier gas, increasing the length of the path of flow through the deposition chamber by increasing the chamber length, or by increasing the surface area of the cylinder in the decomposition chamber in contact with the precursor gas (see column 8, lines 46-56, column 9, lines 14-28 and lines 40-45).

The Examiner points out that all of these parameters are processing variables that are an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Robles with that of Vaartstra, Campbell, and Aitchison because an increase of the residence time of precursor gases in a deposition chamber increases the deposition reaction by the precursor, resulting in less precursor gas being sent to a mechanical pump in a deposition apparatus, thereby decreasing the amount of damage incurred by the pump due to harmful chemicals.

Regarding claim 7, Vaartstra, Campbell and Aitchison fail to teach a surge flow suppresser connected to said outlet of said trap, Robles teaches a surge flow suppresser **120** connected to said outlet of said trap (figure 1) as a means of controlling the pressure and residence time of the gaseous reactants in the chamber (column 3, lines 63-65).

It would have been obvious to one skilled in the art to combine the teachings of Robles with that of Vaartstra, Campbell, and Aitchison because it can control the pressure and residence time of the gaseous reactants in the chamber.

Claims 8, 10, 12, 14, 15, 16, 18, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell, US Patent 6,461,436, in view of Aitchison, US Patent 5,928,426.

Regarding claim 8, Campbell teaches an atomic layer deposition apparatus comprising of a first precursor gas source **6** having a first valve **25** connected thereto, a second precursor gas source **9** having a second valve **8** connected thereto, a purge gas source **7** having a third valve (on picture, but not labeled) connected thereto, wherein the first, second and third valves permit sequential flow of the first precursor gas, the second precursor gas and the purge gas defining a deposition cycle (column 3, lines 3-39) and a reaction chamber **10** connected to the said first, said second, and said third valves (figures 1-4).

Campbell fails to teach a gas phase reaction trap connected to the reaction chamber; the trap having an inlet connected to said the reaction chamber, and an outlet, wherein the said has a residence time at least equal to one deposition cycle; and a backing pump connected to the outlet of the trap. However, Aitchison teaches a gas phase reaction trap **30** connected to the reaction chamber **14**; the trap having an inlet connected to said the reaction chamber, and an outlet, wherein the said has a residence time at least equal to one deposition cycle (column 5, lines 13-62) and a backing pump **22** connected to the outlet of the trap (column 12, lines 47-50) as part of a trapping apparatus that promotes the complete removal of active gas species from the exhaust gas.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aitchison with that of Campbell because a trap can further

promote the complete removal of active gas species, some of which can be fatal, from the exhaust gas of a reaction chamber.

Regarding claim 10, Campbell teaches further including a process pump **20, 30** connected between the inlet of the trap and the reaction chamber (Note: the process pump **20, 30** of Campbell could be attached to the trap **40** of Aitchison).

Regarding claim 12, Aitchison further teaches heating means for the trap (column 5, lines 45-63).

Regarding claim 14, Campbell teaches a method of atomic layer deposition comprising the steps of sequentially flowing a first precursor gas **6**, a purge gas **7**, a second precursor gas **9**, and a purge gas **7** into a reaction chamber **10**, thereby defining a deposition cycle (column 3, lines 3-39 and figures 1-4).

Campbell fails to teach removing the gaseous effluent from the reaction chamber to a gas phase reaction trap and allowing the gaseous effluent to reside in the trap for an time at least equal to the deposition cycle.

Aitchison teaches removing the gaseous effluent from the reaction chamber to a gas phase reaction trap and allowing the gaseous effluent to reside in the trap for an time at least equal to the deposition cycle (column 5, lines 26-50) as part of a trapping

apparatus that promotes the complete removal of active gas species from the exhaust gas.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aitchison with that of Campbell because a trap can further promote the complete removal of active gas species, some of which can be fatal, from the exhaust gas of a reaction chamber.

Regarding claim 15, Aitchison further teaches pumping the gaseous effluent with a backing pump after allowing the gaseous effluent to reside in the trap (column 12, lines 47-50).

Regarding claim 16, Campbell further teaches pumping the gaseous effluent with a process pump to the said trap (Note: the process pump **20, 30** of Campbell could be attached to the trap **40** of Aitchison).

Regarding claim 18, Campbell teaches a deposition apparatus comprising of a first precursor gas source **6** having a first valve **25** connected thereto, a second precursor gas source **9** having a second valve **8** connected thereto, a purge gas source **7** having a third valve (in figure, but not labeled) connected thereto, wherein the first, second and third valves permit sequential flow of the first precursor gas, the second

precursor gas and the purge gas defining a deposition cycle (column 3, lines 3-39) and a reaction chamber **10**, connected to the first, second, and third valves.

Campbell fails to teach a gas phase reaction trap connected to the said reaction chamber; the trap having an inlet connected to said reaction chamber, and an outlet, wherein the said trap has a residence time at least equal to one deposition cycle. Aitchison teaches a gas phase reaction trap **30** connected to the said reaction chamber **14,** the trap having an inlet connected to said reaction chamber (column 12, lines 47-50), and an outlet, wherein the said trap has a residence time at least equal to one deposition cycle as part of a trapping apparatus that promotes the complete removal of active gas species from the exhaust gas.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Aitchison with that of Campbell because a trap can further promote the complete removal of active gas species, some of which can be fatal, from the exhaust gas of a reaction chamber.

Regarding claim 19, Aitchison further teaches including a backing pump connected to the outlet of the trap (column 12, lines 47-50).

Regarding claim 21, Campbell further teaches including a process pump, connected between the inlet of the trap and the reaction chamber (Note: the process pump **20, 30** of Campbell could be attached to the trap **40** of Aitchison).

Regarding claim 23, Aitchison further teaches including heating means for the trap (column 5, lines 45-63).

Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell and Aitchison as applied to claims 8 and 18 above, and further in view of Desbiolles, WO 03/101576A1 (as previously cited).

Regarding claims 9 and 20, Campbell and Aitchison fail to teach the inlet and the outlet are at the top of the said trap. Desbiolles teaches an apparatus the inlet **2** and said outlet **6** are at the top of said trap (figure 1) because the optimal effectiveness of the trap can be preserved without harming the usefulness of the chamber (page 3, lines 12-14).

It would have been obvious to one of ordinary skill in this art at the time of the invention to combine the teachings of Desbiolles with that of Campbell and Aitchison because the optimal effectiveness of the trap can be preserved without harming the usefulness of the chamber.

Claim 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra, Campbell, and Aitchison as applied to claims 8 and 18 above, and further in view of Mariella, US Patent 6,730,204 (as previously cited).

Regarding claims 13 and 24, Campbell and Aitchison fail to teach an electrode in the trap and a ground connection to the said trap. Mariella teaches an electrode in said trap and a ground connection to said trap as a trap apparatus that uses DC current (column 5, line 42 and 43. The examiner notes that the trap taught by Mariella contains a DC voltage. An inherent feature of a DC voltage, as well as an AC voltage, contains both an electrode and a ground connection).

It would have been obvious to one skilled in this art to combine the teachings of Mariella with that of Vaartstra, Campbell and Aitchison to in order to fabricate a trap apparatus that is powered on electrical current

Claims 11, 22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell, and Aitchison as applied to claim 18 above, and further in view of Robles et al, US Patent 6,663,713 (as previously cited).

Regarding claims 11 and 22, Campbell and Aitchison fail to teach the residence time is greater than the deposition cycle. However, Robles teaches the residence time is greater than the deposition cycle by increasing the residence time through different parameters. To further explain, Robles teaches that the residence time inside of a deposition chamber can be increased through by regulating the flow of precursor gas and carrier gas, increasing the length of the path of flow through the deposition chamber by increasing the chamber length, or by increasing the surface area of the cylinder in the decomposition chamber in contact with the precursor gas (see column 8, lines 46-56, column 9, lines 14-28 and lines 40-45).

The Examiner points out that all of these parameters are processing variables that are an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed.

Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Robles with that of Campbell and Aitchison because an increase of the residence time of precursor gases in a deposition chamber increases the deposition reaction by the precursor, resulting in less precursor gas being sent to a mechanical pump in a deposition apparatus, thereby decreasing the amount of damage incurred by the pump due to harmful chemicals.

Regarding claim 25, Campbell and Aitchison fail to teach a surge flow suppresser connected to said outlet of said trap, Robles teaches a surge flow suppresser **120** connected to said outlet of said trap (figure 1) as a means of controlling the pressure and residence time of the gaseous reactants in the chamber (column 3, lines 63-65).

It would have been obvious to one skilled in the art to combine the teachings of Robles with that of Campbell, and Aitchison because it can control the pressure and residence time of the gaseous reactants in the chamber.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell and Aitchison as applied to claim 14 above, and further in view of Robles et al, US Patent 6,663,713 (as previously cited).

Regarding claim 17, Campbell and Aitchison fails to teach the gaseous effluent resides in the trap for a time is greater than the deposition cycle. However, Robles teaches the gaseous effluent resides in the trap for a time is greater than the deposition cycle by increasing the residence time through different parameters. To further explain, Aitchison teaches a trap that works very similar to a chemical vapor deposition chamber to promote further deposition of precursor gases. Robles teaches that the residence time inside of a deposition chamber can be increased through by regulating the flow of precursor gas and carrier gas, increasing the length of the path of flow through the deposition chamber by increasing the chamber length, or by increasing the surface area of the cylinder in the decomposition chamber in contact with the precursor gas (see column 8, lines 46-56, column 9, lines 14-28 and lines 40-45).

The Examiner points out that all of these parameters are processing variables that are an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another

dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Robles with that of Campbell and Aitchison because an increase of the residence time of precursor gases in a deposition chamber increases the deposition reaction by the precursor, resulting in less precursor gas being sent to a mechanical pump in a deposition apparatus, thereby decreasing the amount of damage incurred by the pump due to harmful chemicals.

Response to Remarks

Applicant has amended claims in response to first Non-Final Office action to more clearly define terms. Claims 1-25 are still pending in the application

Applicant's arguments with respect to amended claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quovaunda Jefferson whose telephone number is 571-

272-5051. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QVJ

MICHELLE ESTRADA
PRIMARY EXAMINER